

Lam Geotechnics Limited

Contract No. HK/2011/07 Wanchai Development Phase II and Central Wanchai Bypass (Shatin to Central Link (SCL) Protection Works at Causeway Bay Typhoon Shelter) Final EM&A Report

CONTRACT NO: HK/2011/07

WANCHAI DEVELOPMENT PHASE II AND CENTRAL WANCHAI BYPASS SAMPLING, FIELD MEASUREMENT AND TESTING WORK (STAGE 2)

ENVIRONMENTAL PERMIT NO. EP- 416/2011 AND FEP-01/416/2011

SHATIN TO CENTRAL LINK (SCL) PROTECTION WORKS AT CAUSEWAY BAY TYPHOON SHELTER (CBTS)

> FINAL ENVIRONMENTAL MONITORING AND AUDIT REPORT

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and

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DATE:

19 August 2015



Ref.: AACWBIECEM00_0_7049L.15

19 August 2015

By Post and Fax (2691 2649)

AECOM Asia Company Limited 11/F, Tower 2 Grand Central Plaza 138 Shatin Rural Committee Road Shatin, New Territories Hong Kong

Attention: Mr. Conrad Ng

Dear Mr. Ng,

Re: Shatin to Central Link – Protection Works at Causeway Bay Typhoon Shelter (EP-416/2011 & FEP-01/416/2011) Final Environmental Monitoring and Audit Report

Reference is made to the Environmental Team's submission of the captioned Final Environmental Monitoring and Audit (EM&A) Report received by e-mail on 19 August 2015.

Please be informed that we have no adverse comment on the captioned submission.

Should you have any queries, please do not hesitate to contact the undersigned.

Yours sincerely,

David Yeung Independent Environmental Checker

c.c.

Mr. Cyrus Wong by fax: 2761 1508 HyD by fax: 2714 5289 Mr. Bond Chow HvD by fax: 2577 5040 Mr. Jason Cheung CEDD AECOM Mr. Peter Poon by fax: 3912 3010 Mr. Frankie Fan by fax: 2587 1877 AECOM MTRCL Mr. Richard Kwan by fax: 2993 7577 Mr. Raymond Dai by fax: 2882 3331 Lam

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EXECUTIVE SUMMARY

- i. This is the Final Environmental Monitoring and Audit (EM&A) Report prepared for the Shatin to Central Link (SCL) Protection Works at Causeway Bay Typhoon Shelter (CBTS) under Environmental Permit no. EP-416/2011 and Further Environmental Permit no. FEP-01/416/2011. This report presents the environmental monitoring and audit findings and information during the reporting period from November 2011 to July 2015.
- Application for surrender of FEP-01/416/2011 was submitted to EPD on 26 June 2015. EPD letter on acknowledgement of FEP-01/416/2011 surrender application was issued to MTRC on 3 August 2015.

Major construction works undertaken during construction phase monitoring programme

- iii. The principle construction activities undertaken during the monitoring period included as follows:
 - Temporary reclamation works with total reclamation area of approximately 0.4 ha in Causeway Bay Typhoon Shelter:
 - Dredging of around 1 ha at the southeast corner of the Causeway Bay Typhoon
 Shelter
 - Construction of a section of tunnel structure (approximately 160m long) above the proposed Central Wan Chai Bypass;
 - Relocation of the temporary Royal Hong Kong Yacht Club (RHKYC) jetty;
 - Removal of the temporary reclamation

Noise Monitoring

- iv. Noise monitoring during daytime was conducted at monitoring station M2b Noon-day gun area on a weekly basis throughout the monitoring programme.
- v. Two limit level noise exceedances were recorded throughout the monitoring programme. Based on review on Contractor works activities and mitigation measures implemented, the recorded exceedances were considered not related to the designated project works.

Air Quality Monitoring

- vi. 1-hour and 24-hour Total Suspended Particulates (TSP) monitoring were conducted at CMA3a CWB PRE Site Office throughout the monitoring programme.
- vii. Two action level 1hr TSP level exceedances were recorded throughout the monitoring programme. Based on review on Contractor works activities and mitigation measures implemented, the recorded exceedances were considered not related to the designated project works.

Water Quality Monitoring

- viii. Water quality monitoring at C7 was conducted three days per week during the reporting period.
- ix. Twenty-one action level and five limit level DO level exceedances; three action level and ten limit level turbidity level exceedances; and one action level and two limit levels SS level



exceedances were recorded throughout the monitoring programme during the construction phase monitoring. Based on review on Contractor works activities and mitigation measures implemented, the recorded exceedances were considered not related to the designated project works.

- The post construction water quality monitoring was commenced in accordance with condition
 2.26 in the approved EM&A manual from 11 April 2015 to 11 May 2015 for four weeks period to confirm for the post construction water quality.
- xi. No action or limit level exceedance was recorded during the post construction water quality monitoring period and the post construction water quality monitoring confirmed no deterioration in water quality.

Complaints, Notifications of Summons and Successful Prosecutions

xii. Throughout the monitoring programme, no environmental complaint nor prosecution was recorded under the Project.



1. INTRODUCTION

1.1 Scope of the Report

- 1.1.1. Lam Geotechnics Limited (LGL) has been appointed to work as the Environmental Team (ET) under Environmental Permit no. EP-416/2011 and Further Environmental permit nos. FEP-01/416/2011 to implement the Environmental Monitoring and Audit (EM&A) programme as stipulated in the EM&A Manual of the approved Environmental Impact Assessment (EIA) Report for Shatin to Central Link (SCL) Protection Works at Causeway Bay Typhoon Shelter (CBTS) (Register No.: AEIAR-159/2011) and in the EM&A Manual of the approved EIA Report for Shatin to Central Link Protection Works at Causeway Bay Typhoon Shelter (Register No. AEIAR-159/2011).
- 1.1.2. This report presents the environmental monitoring and auditing work carried out in accordance to the Section 7.5 of EM&A Manual and Environmental Monitoring and Audit Requirements of Environmental permit nos. EP-416/2011 and Further Environmental permit nos. FEP-01/416/2011.
- 1.1.3. This report documents the summary of findings for the EM&A programme undertaken from November 2011 to July 2015.
- 1.1.4. The construction phase of the Project was substantially completed in April 2015. No critical environmental deficiency and no project related exceedances was identified throughout the monitoring period. No environmental complaint and prosecution were received. This report summarize the monitoring findings throughout the monitoring programme prior to the termination of the overall EM&A monitoring programme.
- 1.1.5. Application for surrender of FEP-01/416/2011 was submitted to EPD on 26 June 2015. EPD letter on acknowledgement of FEP-01/416/2011 surrender application was issued to MTRC on 3 August 2015.

1.2 Structure of the Report

- **Section 1** *Introduction* details the scope and structure of the report.
- Section 2 *Project Background* summarizes background and scope of the project, site description, project organization and contact details of key personnel during the reporting period.
- Section 3 *Monitoring Requirements* summarizes all monitoring parameters, monitoring locations, monitoring frequency, duration and action plan.
- Section 4 Summary of *Monitoring Results and Exceedances* summarizes the monitoring results and exceedances recorded throughout the monitoring programme.



- Section 5 Review on Site Environmental and Compliance summarizes the auditing of monitoring results, all exceedances of environmental parameters.
 Section 6 Summary of Complaints, Notification of summons and Prosecution summarizes the cumulative statistics on complaints, notification of summons and prosecution
 Section 7 Review on EM&A Programme review the validity of EIA predictions, effectiveness of the environmental management system.
- Section 8 Conclusion



2. PROJECT BACKGROUND

2.1 Background

- 2.1.1. The "Shatin to Central Link Protection Works at Causeway Bay Typhoon Shelter" (hereafter called "the Project") is a Designed Project (DP) under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO). The Environmental Impact Assessment (EIA) Reports for Shatin to Central Link Protection Works at CBTS (Register No. AEIAR-159/2011) has been approved on 25 Feb 2011.
- 2.1.2. The key purpose of the SCL Protection Works and associated works at CBTS involves the construction of a 160m tunnel box by cut-and-cover method at the crossing above the Central Wan Chai Bypass (CWB) tunnels. Temporary reclamation is required and has been authorized under the Foreshore and Sea-bed (reclamations) Ordinance. With the presence of the Protection Works, future construction of the SCL on both sides of the CWB tunnels is protected and ensured feasible without damaging or unduly affecting the CWB tunnels which could be operational by then. This arrangement will also minimize public nuisance and impact to the surrounding environment as it can reduce the reclamation area for subsequent construction of the SCL after CWB is completed. Nevertheless, the Protection Works cannot serve to function for any railway service or operation before the completion of SCL.
- 2.1.3. The SCL is strategically important for connecting the existing railway lines into an integrated rail network. The east-west connection will allow the set up of a 57km East-West Corridor across the city connecting Wu Kai Sha with Tuen Mun via Kowloon; whilst the north-south connection will operate over a 41km North-South Corridor with services originating in Lok Ma Chau or Lo Wu travelling via the existing East Rail Line (EAL) to Admiralty. This will enable a direct transportation linkage between Mainland China and Hong Kong Island.

2.2 Scope of the Project and Site Description

- 2.2.1. The study area encompasses existing developments in Causeway Bay Typhoon Shelter as shown in *Figure 2.1*. The scope of the Project includes:
 - Temporary reclamation, which occupies about 0.7ha of Government foreshore and sea-bed (of which 0.3ha is already authorized under CWB project, i.e. additional reclamation of 0.4ha is required).
 - Dredging works at the southeast corner of the CBTS to provide space for temporary relocation of anchorage area due to the additional temporary reclamation for the Project.
 - Construction of a section of the twin track railway tunnel structure (approximately 160m long) above the proposed CWB located entirely offshore within the CBTS.
 - Relocation of the temporary Royal Hong Kong Yacht Club (RHKYC) jetty within the CWB temporary reclamation to a new location.
 - Removal of the temporary reclamation, except the small area at the southwest corner of the reclamation (which will be removed by the SCL project upon completion of



the future SCL tunnels connecting to the proposed South Ventilation Building (SOV)).

2.2.2. The Project contains Schedule 2 DP that, under the EIAO, requires Environmental Permits (EPs) to be granted by the DEP before they may either be constructed or operated. *Table 2.1* summarises the DP under this Project. *Figure 2.1* shows the location of this Schedule 2 DPs.

ltem	Designated Project	EIAO Reference	Reason for inclusion
DP1	Temporary reclamation, which occupies about 0.7ha of Government foreshore and sea-bed	Schedule 2, Part I, C.12	A dredging operation which is less than 100m from a seawater intake point

Table 2.1 Schedule 2 Designated Projects under this Project

2.3 Project Organization and Contact Personnel

- 2.3.1 Civil Engineering and Development Department and Highways Department are the overall project controllers for the construction phase of the Project, Project Engineer, Contractor(s), Environmental Team and Independent Environmental Checker are appointed to manage and control environmental issues.
- 2.3.2 The proposed project organization and lines of communication with respect to environmental protection works are shown in *Figure 2.2*. Key personnel and contact particulars are summarized in *Table 2.2*:

Party	Role	Post	Name	Contact No.	Contact Fax
AECOM	Engineer's Representative for WDII	Principal Resident Engineer	Mr. Frankie Fan	2587 1778	2587 1877
	Engineer's Representative for CWB	Principal Resident Engineer	Mr. Peter Poon	3912 3388	3912 3010
MTR Corporation	Permit Holder	Environment Manager	Mr. Richard Kwan	2688 1179	2993 7577
Limited		Environmental Engineer I	Miss. Viola Tong	3127 6296	
		Environmental Engineer II	Mr. Chris Mak	3127 6297	
China State	Contractor	Project Director	Mr. Chris Leung	3557 6393	2566 2192
Construction Engineering (HK) Ltd.	under Contract no. HY/2009/15	Senior Site Manager	Y Huo	3557 6368	2566 2192
		Contractor's Representative	Mr. Gene Cheung	3557 6395	
		Project Manager	Mr. Andrew Wong	3557 6371	

 Table 2.2
 Contact Details of Key Personnel



Lam Geotechnics Limited

Party	Role	Post	Name	Contact No.	Contact Fax
		Environmental Officer	Mr. Andy Mak	3557 6347	
RAMBOLL ENVIRON Hong Kong Limited	Independent Environmental Checker (IEC)	Independent Environmental Checker (IEC)	Mr. David Yeung	3465 2888	3465 2899
Lam Geotechnics Limited	Environmental Team (ET)	Environmental Team Leader (ETL)	Mr. Raymond Dai	2882 3939	2882 3331

2.4 Principle Work and Activities

Major construction works undertaken during construction phase monitoring programme

- 2.4.1 The principle construction activities undertaken during the monitoring period included as follows:
 - Temporary reclamation works with total reclamation area of approximately 0.4 ha in Causeway Bay Typhoon Shelter:
 - Dredging of around 1 ha at the southeast corner of the Causeway Bay Typhoon Shelter
 - Construction of a section of tunnel structure (approximately 160m long) above the proposed Central Wan Chai Bypass;
 - Relocation of the temporary Royal Hong Kong Yacht Club (RHKYC) jetty;
 - Removal of the temporary reclamation
- 2.4.2 Implementation status of the recommended mitigation measures throughout the monitoring programme is presented in *Appendix 2.1*.



3. MONITORING REQUIREMENTS

3.1. Noise Monitoring

NOISE MONITORING STATION

3.1.1. The noise monitoring stations for the Project are listed and shown in *Table 3.1* and *Figure* <u>3.1.</u> <u>Appendix 3.1</u> shows the established Action/Limit Levels for the monitoring works.

	oise monitoring station
Station	Description
M2b	Noon Gun Area

Table 3.1 Noise Monitoring Station

NOISE MONITORING PARAMETERS, FREQUENCY AND DURATION

- 3.1.2. The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). L_{eq (30 minutes)} shall be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays. For all other time periods, L_{eq (5 minutes)} shall be employed for comparison with the Noise Control Ordinance (NCO) criteria. Supplementary information for data auditing, statistical results such as L₁₀ and L₉₀ shall also be obtained for reference.
- 3.1.3. Noise monitoring shall be carried out at all the designated monitoring stations. The monitoring frequency shall depend on the scale of the construction activities. The following is an initial guide on the regular monitoring frequency for each station on a weekly basis when noise generating activities are underway:
 - One set of measurements between 0700 and 1900 hours on normal weekdays.

MONITORING EQUIPMENT

- 3.1.4. As referred to in the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agree to within 1.0 dB.
- 3.1.5. Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.



3.2. Air Monitoring

AIR QUALITY MONITORING STATION

3.2.1. The air monitoring stations for the Project are listed and shown in *Table 3.2* and *Figure 3.1*. *Appendix 3.1* shows the established Action/Limit Levels for the monitoring works.

Table 3.2 Air Monitoring Station

Station ID	Monitoring Location	Description
CMA3a	CWB PRE Site Office	Causeway Bay

AIR MONITORING PARAMETERS, FREQUENCY AND DURATION

- 3.2.2. One-hour and 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The 24-hour TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B.
- 3.2.3. All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and any other local atmospheric factors affecting or affected by site conditions, etc., shall be recorded down in detail.

SAMPLING PROCEDURE AND MONITORING EQUIPMENT

- 3.2.4. For regular impact monitoring, the sampling frequency of at least once in every six-days, shall be strictly observed at all the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six-days should be undertaken when the highest dust impact occurs.
- 3.2.5. High volume samplers (HVSs) in compliance with the following specifications shall be used for carrying out the 1-hour and 24-hour TSP monitoring:
 - 0.6 1.7 m3 per minute adjustable flow range;
 - Equipped with a timing / control device with +/- 5 minutes accuracy for 24 hours operation;
 - Installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;
 - Capable of providing a minimum exposed area of 406 cm2;
 - Flow control accuracy: +/- 2.5% deviation over 24-hour sampling period;
 - Equipped with a shelter to protect the filter and sampler;
 - Incorporated with an electronic mass flow rate controller or other equivalent devices;
 - Equipped with a flow recorder for continuous monitoring;
 - Provided with a peaked roof inlet;
 - Incorporated with a manometer;
 - Able to hold and seal the filter paper to the sampler housing at horizontal position;
 - Easily changeable filter; and
 - Capable of operating continuously for a 24-hour period.



3.2.6. Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognized primary standard and be calibrated annually. The concern parties such as IEC shall properly document the calibration data for future reference. All the data should be converted into standard temperature and pressure condition.

LABORATORY MEASUREMENT / ANALYSIS

- 3.2.7. A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited.
- 3.2.8. Filter paper of size 8" x 10" shall be labelled before sampling. It shall be a clean filter paper with no pinholes, and shall be conditioned in a humidity-controlled chamber for over 24-hours and be pre-weighed before use for the sampling.
- 3.2.9. After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper shall then be returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.
- 3.2.10. All the collected samples shall be kept in a good condition for 6 months before disposal.

3.3. Water Quality Monitoring

3.3.1. The EIA Report has identified that the key water quality impact would be associated with the dredging works during the construction phase. Marine water quality monitoring for dissolved oxygen (DO), suspended solid (SS) and turbidity is therefore recommended to be carried out at selected WSD flushing water intakes. The impact monitoring should be carried out during the proposed dredging works to ensure the compliance with the water quality standards.

Water Quality Monitoring Station

3.3.2. It is proposed to monitor the water quality at one cooling water intake along the seafront of the Victoria Harbour. The proposed water quality monitoring station of the Project is shown in *Table 3.3* and *Figure 3.1*. *Appendix 3.1* shows the established Action/Limit Levels for the monitoring works.

Station Ref.	Location	Easting	Northing	
Cooling Water Intake				
C7	Windsor House	837193.7	816150.0	

 Table 3.3
 Marine Water Quality Station for Water Quality Monitoring



WATER QUALITY PARAMETERS AND FREQUENCY

- 3.3.3. Monitoring of dissolved oxygen (DO), turbidity and suspended solids (SS) shall be carried out at cooling water intake. DO and Turbidity are measured in-situ while SS is determined in laboratory.
- 3.3.4. In association with the water quality parameters, other relevant data shall also be measured, such as monitoring location/position, time, sampling depth, water temperature, pH, salinity, dissolved oxygen (DO) saturation, weather conditions, sea conditions, tidal stage, and any special phenomena and work underway at the construction site etc.

SAMPLING PROCEDURES AND MONITORING EQUIPMENT

3.3.5. The interval between two sets of monitoring should not be less than 36 hours except where there are exceedances of Action and/or Limit Levels, in which case the monitoring frequency will be increased. *Table 3.4* shows the proposed monitoring frequency and water quality parameters. Duplicate in-situ measurements and water sampling should be carried out in each sampling event. For selection of tides for in-situ measurement and water sampling, tidal range of individual flood and ebb tides should be not less than 0.5m.

Activities	Monitoring Frequency ¹	Parameters ²		
During the 4-week baseline monitoring period	Three days per week, at mid- flood and mid-ebb tides	Turbidity, Suspended Solids (SS), Dissolved Oxygen (DO), pH, Temperature, Salinity		
During marine construction works	Three days per week, at mid- flood and mid-ebb tides	Turbidity, Suspended Solids (SS), Dissolved Oxygen (DO), pH, Temperature, Salinity		
After completion of marine construction works	Three days per week, at mid- flood and mid-ebb tides	Turbidity, Suspended Solids (SS), Dissolved Oxygen (DO), pH, Temperature, Salinity		

 Table 3.4
 Marine Water Quality Monitoring Frequency and Parameters

Notes:

1. For selection of tides for in-situ measurement and water sampling, tidal range of individual flood and ebb tides should be not less than 0.5m.

2. Turbidity should be measured in situ whereas SS should be determined by laboratory.

DISSOLVED OXYGEN AND TEMPERATURE MEASURING EQUIPMENT

- 3.3.6. The instrument should be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and use a DC power source. It should be capable of measuring:
 - a dissolved oxygen level in the range of 0-20 mg/l and 0-200% saturation
 - a temperature of 0-45 degree Celsius



- 3.3.7. It should have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables should be available for replacement where necessary. (e.g. YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).
- 3.3.8. Should salinity compensation not be build-in in the DO equipment, in-situ salinity shall be measured to calibrate the DO equipment prior to each DO measurement.

TURBIDITY MEASUREMENT INSTRUMENT

3.3.9. The instrument should be a portable, weatherproof turbidity-measuring instrument complete with comprehensive operation manual. The equipment should use a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU and be complete with a cable (e.g. Hach model 2100P or an approved similar instrument).

SAMPLER

3.3.10. A water sampler comprises a transparent PVC cylinder, with a capacity of not less than 2 litres, and can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (e.g. Kahlsico Water Sampler or an approved similar instrument).

SAMPLE CONTAINER AND STORAGE

3.3.11. Water samples for suspended solids measurement should be collected in high-density polythene bottles, packed in ice (cooled to 4°C without being frozen), and delivered to ALS Technichem (HK) Pty Ltd. as soon as possible after collection for analysis.

WATER DEPTH DETECTOR

3.3.12. A portable, battery-operated echo sounder shall be used for the determination of water depth at each designated monitoring station. This unit can either be handheld or affixed to the bottom of the workboat, if the same vessel is to be used throughout the monitoring programme.

<u>SALINITY</u>

3.3.13. A portable salinometer capable of measuring salinity in the range of 0-40 ppt shall be provided for measuring salinity of the water at each of monitoring location.

MONITORING POSITION EQUIPMENT

3.3.14. A hand-held or boat-fixed type digital Global Positioning System (GPS) with waypoint bearing indication or other equivalent instrument of similar accuracy shall be provided and used during monitoring to ensure the monitoring vessel is at the correct location before taking measurements.



CALIBRATION OF IN-SITU INSTRUMENTS

- 3.3.15. All in-situ monitoring instrument shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or equivalent before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.
- 3.3.16. For the on site calibration of field equipment by the ET, the BS 127:1993, "Guide to Field and on-site test methods for the analysis of waters" should be observed.
- 3.3.17. Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

LABORATORY MEASUREMENT / ANALYSIS

3.3.18. Analysis of suspended solids has been carried out in a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd. Water samples of about 1L shall be collected at the monitoring stations for carrying out the laboratory SS determination. The SS determination work shall start within 24 hours after collection of the water samples. The SS determination shall follow APHA 19ed or equivalent methods subject to the approval of IEC and EPD.



4. SUMMARY OF MONITORING RESULTS AND EXCEEDANCES

4.0.1. Overall layout showing work areas and monitoring stations are shown in *Figure 2.1* and *Figure 3.1*.

4.1. Summary of Noise Monitoring Results and Exceedances

- 4.1.1. The commencement date of dredging work was 25 November 2011. Noise monitoring was commenced on 29 November 2011.
- 4.1.2. The noise monitoring station is shown in *Table 4.1* below:

Table 4.1	Noise	Monitoring	Stations
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Station	Description
M2b	Noon Gun Area

- **4.1.3.** Total two limit level noise exceedances were recorded throughout the monitoring programme. Based on review on Contractor works activities and mitigation measures implemented, the recorded exceedances were considered not related to the designated project works.
- 4.1.4. The exceedances recorded throughout the monitoring programme were contributed by the construction noise emanated from non EP-416 designated Project works around the monitoring stations.
- 4.1.5. Noise monitoring results measured are reviewed and summarized for the monitoring programme. Details of noise monitoring results in graphical presentation can be referred in <u>Appendix 4.1</u>.



4.2. Summary of Air Monitoring Results and Exceedances

- 4.2.1 The commencement date of dredging work was 25 November 2011. Air quality monitoring was commenced on 25 November 2011.
- 4.2.2 The air monitoring stations is shown in *Table 4.2* below.

Table 4.2 Air Monitoring Stations

Station	Description
CMA3a	CWB PRE Site Office

- 4.2.3 Total two action level 1hr TSP level exceedances were recorded throughout the monitoring programme. Based on review on Contractor works activities and mitigation measures implemented, the recorded exceedances were considered not related to the designated project works.
- 4.2.4 The exceedances recorded throughout the monitoring programme were influenced by the ambient air quality condition with high Air Pollution Index/ Air Quality Health Index indicating severe air pollution recorded on the monitoring date.
- 4.2.5 Air Quality monitoring results measured are reviewed and summarized for the monitoring programme. Details of air monitoring results and graphical presentation can be referred in *Appendix 4.2*.



4.3. Summary of Water Monitoring Results and Exceedances

4.3.1 The commencement date of dredging work was 25 November 2011. Water quality monitoring was commenced on 25 November 2011. The water quality monitoring station is summarized in *Table 4.3* below:

Table 4.3	Water	Monitoring	Station
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Station Ref.	Location	Easting	Northing		
Cooling Water Intake					
C7	Windsor House	837193.7	816150.0		

- 4.3.2 Total twenty-one action level and five limit level DO level exceedances; three action level and ten limit level turbidity level exceedances; and one action level and two limit levels SS level exceedances were recorded throughout the monitoring programme during the construction phase water quality monitoring. Based on review on Contractor works activities and mitigation measures implemented, the recorded exceedances were considered not related to the designated project works.
- 4.3.3 The exceedances recorded throughout the monitoring programme were mainly influenced by the non- Project works factors present around the water quality monitoring stations as follow;
 - Natural variation of water quality in relation to water circulation during tidal change within Causeway Bay Typhoon Shelter
 - Floating refuses and suspended particles present within Causeway Bay Typhoon Shelter
 - Contaminated organic discharge from culverts around monitoring stations potential related to upstream pollution sources
- 4.3.4 As confirmed by the CWB RSS, the marine based construction activities under Further Environmental Permit FEP-01/416/2011 have been completed by 9 April 2015. The post construction water quality monitoring was commenced in accordance with condition 2.26 in the approved EM&A manual from 11 April 2015 to 11 May 2015 for four weeks period to confirm for the post construction water quality.
- 4.3.5 No action or limit level exceedance was recorded during the post construction water quality monitoring period and the post construction water quality monitoring confirmed no deterioration in overall water quality.
- 4.3.6 Water monitoring results measured are reviewed and summarized for the monitoring programme. Details of water quality monitoring results and graphical presentation can be referred in *Appendix 4.3*.



4.4 Construction Waste Summary

4.4.1 Inert C&D waste was disposed & no Non-inert C&D wastes disposed were during the construction period of the Projected. The Details of the waste flow table are summarized in **Table 4.4**

Waste Type	Cumulative amount of waste generated	Location of Disposal
Inort CPD materials disposed m ³	32,670	TM38
ment C&D materials disposed, m	6,267	TKO137
	25,395.7	TS2
	1,228	WDII
Inert C&D materials recycled, m ³	1416	Lun Ku Tan
	352	WENT Landfill
	1,049	HY/2011/03 (HZM)
Non-inert C&D materials disposed, m ³	NIL	N/A
Non-inert C&D materials recycled, m^3	NIL	N/A
Chemical waste disposed, kg	NIL	N/A
Marine Sediment (Type 1 – Open Sea Disposal), m ³ (Bulk Volume)	10,640	Cheung Chau South
Marine Sediment (Type 1 – Open Sea Disposal (Dedicate Sites) & Type 2 – Confined Marine Disposal), m ³ (Bulk Volume)	7,500	East of Sha Chau
Marine Sediment (Type 3 – Special Treatment / Disposal contained in geosynthetic Containers), m ³	NIL	N/A

Table 4.4	Details	of Waste	Disposal



5. REVIEW ON ENVIRONMENTAL IMPLEMTATION AND COMPLIANCE

5.0.1. The Event Action Plan for construction noise, air quality and water quality are presented in <u>Appendix 5.1</u>.

5.1. Noise Monitoring

5.1.1. No project related exceedances were recorded during the monitoring programme. No remedial action was therefore required.

5.2. Air Monitoring

5.2.1. No project related exceedances were recorded during the monitoring programme. No remedial action was therefore required.

5.3. Water Quality Monitoring

- 5.3.1. No project related exceedances were recorded during the monitoring programme. No remedial action was therefore required.
- 5.3.2. Post construction water quality monitoring was conducted from 11 April 2015 to 11 May 2015 for four weeks period to confirm for the post construction water quality. No action or limit level exceedance was recorded during the post construction water quality monitoring period and hence confirmed no deterioration in water quality.

5.4. Site Implementation and Compliance Audit

- 5.4.1. Throughout the monitoring period, site inspection were conducted on weekly basis. Environmental mitigation measures as recommended in the Project EIA report and the Project Environmental mitigation implementation schedule were generally implemented by the Contractor during the construction phase of the Projects. The Contractor have rectified for observations and recommendations made during the audit sessions and no cumulative environmental impact was identified during the monitoring programme. No site audit noncompliance was recorded throughout the monitoring programme.
- 5.4.2. No non-compliance from the site audits was recorded throughout the monitoring programme.



6. SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND PROSECUTION

- 6.0.1. No environmental complaint was received throughout the monitoring programme.
- 6.0.2. The details of cumulative complaint log and summary of complaints are presented in *Appendix 6.1*.
- 6.0.3. No notification of summons or prosecution was received throughout the monitoring programme. Cumulative statistic on complaints and successful prosecutions are summarized in *Table 6.1* and *Table 6.2* respectively.

Table 6.1 Cumulative Statistics on Complaints

Reporting Period	No. of Complaints
November 2011 (Commencement of work) – July 2015	0
Total	0

Table 6.2 Cumulative Statistics on Successful Prosecutions

Environmental Parameters	Cumulative No. Brought Forward	No. of Successful Prosecutions this quarter (Offence Date)	Cumulative No. Project-to-Date
Air	-	0	0
Noise	-	0	0
Water	-	0	0
Waste	-	0	0
Total	-	0	0



7. REVIEW ON EM&A PROGRAMME

7.1. Review on the EIA predictions and EM&A monitoring findings

- 7.1.1. For project construction phase air quality monitoring, with the implementation of mitigation measures as recommended in the EIA report during marine and land based construction activities, no adverse air quality impact associated with the Project works was identified during the course of monitoring. Generally, the measured total suspended particulates level was below the EIA predicted worst case scenario.
- 7.1.2. In terms of project construction phase noise monitoring, with the implementation of mitigation measures as recommended in the EIA report during marine and land based construction activities, no project related exceedance was recorded. Despite limit levels were contributed by other project construction works were recorded, upon rectification by other construction project, no further exceedance was recorded during monitoring. In general, no cumulative construction noise impact was recorded with concurrent project in place within the area with mitigation measures in place. Generally, the measured noise level was within the EIA predicted range.
- 7.1.3. For project construction phase water quality monitoring, with the implementation of mitigation measures as recommended in the EIA report during dredging, temporary reclamation and other land based construction activities, no project related exceedance was recorded. Variation in water quality parameters were mainly influenced by environmental factors such as culvert discharge and natural variation in water quality. In addition, based on the post construction water quality monitoring, it was confirmed that there was no deterioration in water quality after completion of marine construction works. Generally, the measured dissolved oxygen level was slightly below the predicted range and the measured suspended solid level was slightly above the predicted range while the measured level for dissolved oxygen and suspended solid are comparable to EIA predicted maximum level for worst case scenario.
- 7.1.4. With the implementation of site mitigation measures during construction phase, no adverse environmental impact on landscape and visual aspect was identified during regular site inspection throughout the course of the construction work.
- 7.1.5. During the construction phase of the Project, the major concurrent construction works under Central WanChai Bypass Project included temporary reclamation at TS4 and TS3 and temporary reclamation removal at TS4. Concurrent land based construction works included foundation works, ELS works, tunnel construction and other associated works at TS4 and foundation works at TS3. No cumulative impact arising from concurrent Projects within the area was identified.



7.2. Environmental Acceptability of the Project

7.2.1. Throughout the monitoring programme, occasionally exceedances for air quality, noise and water quality were recorded. None of the exceedances were considered as Project related. This indicated that the construction works of the Project in general comply with the relevant environmental requirement and environmentally acceptable.

7.3. Review on EIA recommendations and effectiveness and efficiency of mitigation measures

7.3.1. The Contractor generally implemented the mitigation measures as recommended in the EIA report to alleviate for any potential environmental impacts to the surroundings. As no exceedances related to the Project works was recorded and no environmental complaint was received throughout the monitoring programme, it could be concluded that no adverse environmental impact was caused to the surrounding environment and sensitive receivers. The mitigation measures recommended are therefore considered to be effective and efficient in terms of overall environmental impact control throughout the construction period.

7.4. Review on performance of environmental management system

7.4.1. As evidenced by the no project related exceedances and no environmental complaint was received throughout the monitoring programme, the implementation of environmental management system and the overall EM&A programme was considered to be effective in overall environmental impact control. No particular modification to the EM&A programme was considered necessary.



8. CONCLUSION

- 8.0.1. The construction phase of the Project was substantially completed in April 2015. No critical environmental deficiency and no project related exceedances were identified throughout the monitoring period. No environmental complaint and prosecution were received. This report summarizes the monitoring findings throughout the monitoring programme prior to the termination of the overall EM&A monitoring programme.
- 8.0.2. Monitoring works had been undertaken at one air quality monitoring station, one noise monitoring station and one water quality monitoring station for the EM&A programme. Through the monitoring programme, two limit level noise exceedances; two action level 1hr TSP level exceedances; twenty-one action level and five limit level DO level exceedances; three action level and ten limit level turbidity level exceedances; and one action level and two limit levels SS level exceedances throughout the monitoring programme. All the exceedances were considered not related to Projects works and arising from ambient environment sources and other activities within the areas.
- 8.0.3. The EM&A programme was carried out in accordance with the EM&A Manual requirements, minor alternations to the programme proposed were made in response to changing circumstances.
- 8.0.4. Environmental audit inspection were conducted by the Environmental Team and the Independent Environmental Checker throughout the monitoring programme to ensure the proper implementation of site mitigation measures during construction phase of the Project. The Contractor have rectified for site observations and recommendations made during the audit sessions and no cumulative environmental impact was identified during the monitoring programme. No site audit non-compliance was recorded throughout the monitoring programme.
- 8.0.5. No environmental complaint and prosecution recorded throughout the monitoring programme.
- 8.0.6. As evidenced by the no project related exceedances and no environmental complaint was received throughout the monitoring programme, the implementation of environmental management system and the overall EM&A programme was considered effective in overall environmental impact control.



Figure 2.1

Project Layout





Figure 2.2

Project Organization Chart



Project Organization Chart





Figure 3.1

Locations of Monitoring Stations and Sensitive Receivers







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Appendix 2.1

Environmental Mitigation Implementation Schedule



Appendix 3.1

Action and Limit Level



Appendix 4.1

Noise Monitoring Graphical Presentations



Appendix 4.2 Air Quality Monitoring Graphical Presentations



Appendix 4.3

Water Quality Monitoring Graphical Presentations



Appendix 5.1

Event Action Plans



Appendix 6.1

Complaints Log



Appendix 6.2

Notification of Exceedances



Appendix 7.1

Construction Programme